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ANNUAL REPORT
OF
THE CURATOR
OF THE
MUSEUM OF COMPARATIVE ZOÖLOGY
AT HARVARD COLLEGE,
TO THE
PRESIDENT AND FELLOWS OF HARVARD COLLEGE,
FOR
1891-92.

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1892.

FACULTY OF THE MUSEUM.

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ALEXANDER AGASSIZ, *Curator.*

GEORGE L. GOODALE.

JOSIAH D. WHITNEY, *Secretary.*

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CHARLES L. WHITLE	<i>Assistant in the Petrographical Laboratory.</i>

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

DURING the past year the usual courses of instruction have been given at the Museums in Zoölogy by Professor Mark, Dr. Slade, and Mr. Davenport, assisted in the Laboratory work by Messrs. W. M. Woodworth, W. S. Nickerson, J. C. Hubbard, and H. M. Kelly.

Professors Whitney, Shaler, Davis, and Wolff gave courses of instruction in Geology, Palæontology, Physical Geography, and Petrography. Messrs. Harris, Dodge, Kummel, J. B. Woodworth, R. DeC. Ward, Westgate, and R. T. Jackson were the Assistants in the Undergraduate instruction of the Geological Department.

For the details of these courses of instruction, as well as of the summer courses in Geology, I would refer to the accompanying special reports of the Professors and Instructors.

The Reports upon the instruction given in Natural History at the Museum show how little of the work of our Professors is devoted to fostering original research or advanced studies. The fact is, that the Undergraduate classes have become so large, and their demands upon the time of the Professors so pressing, that the function of the latter of encouraging, as University Professors, the attendance of advanced students at Harvard is reduced to a minimum. In fact, the time which our Professors give to elementary teaching is entirely out of proportion to that allowed them for higher instruction. Thus the facilities for original investigation which might be attained at the Museum, and for which it was primarily intended, have been thrown away for

many years, owing to the inability of the authorities to appoint men whose duties should lie in this direction.

For more than twenty years it has been my aim gradually to provide room and materials for such a purpose, and it is not encouraging to find that the time and means thus spent have been so unproductive of better results.

It is not the province of the Museum to provide the necessary instructors, — that belongs to the University ; but it is time that the authorities of the Museum should protest against the ascendancy of the Undergraduate instruction, which threatens to overcome the higher purposes of the institution, and to render it comparatively useless for the progress of science and for the more advanced studies. It is time that the original aim of the Museum should be reasserted, and its highest usefulness be made available. The appointment by the University of half a dozen men to the Natural History Department, to carry on original investigation themselves, and to direct the work of advanced students, would go far towards placing the Museum on a more active plane. We need teachers in Entomology, in Vertebrate and Invertebrate Zoölogy and Palæontology, as well as in Marine Zoölogy ; additional assistants to the Professors and Instructors already teaching are needed to fill the gaps in our advanced instruction. One of the first requisites in carrying out such plans is the removal of the Undergraduate instruction to a new part of the University Museum, the space for which remains in the vacant southwest corner of the Oxford Street façade of the Museum.

It is a surprise to me to find how little seems to be known in this country regarding the publications of the Museum, and the facilities for teaching in our Natural History Laboratories. In a recent circular of information issued by the Bureau of Education,¹ the account given of the Museum Laboratories is very unsatisfactory. This, however, is explained from the unscientific method of preparation of the circular. Our Annual Reports have evidently not been consulted, and the mere sending out of circulars and blanks to be filled up can never supply the requi-

¹ Bureau of Education Circular of Information No. 9, 1891. Biological Teaching in the Colleges of the United States, by John P. Campbell, A. B., Ph. D. (Johns Hopkins), Professor of Biology in the University of Georgia. Washington, Government Printing Office, 1891.

site data for the compilation of an authoritative report such as this circular purports to be. The author who supposes that such loose methods of obtaining information can take the place of careful reference to official reports, or of personal acquaintance with a subject, shows his ignorance of the most rudimentary principles of attacking a scientific problem.

Considerable correspondence has taken place with the officials of the Educational Exhibits and of the Fishery Exhibits of the Columbian Exposition in regard to a representation of the Museum at Chicago. Instructing as it might be to the public to send photographs and a description of the institution as it now stands, this would entail a very considerable outlay both of time and money, neither of which is at the disposal of the officers of the Museum for such a purpose.

The Newport Marine Laboratory has, as usual, been placed at the disposal of the advanced students in Zoölogy, and its tables have been occupied by Messrs. Davenport, Ward, Kelly, Kofoid, Mayer, Weyssse, Lucas, Woodworth, and Gerould, who were occupied during their stay in collecting material for their special investigations. The work of the students was principally devoted to the embryology of Mollusks, of Acalephs, and of Echinoderms. Mr. Woodworth was kind enough in my absence to put the Laboratory in working order for the opening of the season.

We have to thank Colonel Marshall McDonald, United States Fish Commissioner, for facilities granted our students in connection with their work at the Fish Commission Station at Wood's Holl.

In connection with the Newport Laboratory, it is a pleasure to me to report that the Museum has received from Major Theodore K. Gibbs, of Newport, the sum of five thousand dollars to establish the Virginia Barret Gibbs Scholarship Fund, the income of which is to be devoted to assisting students interested in the study of Marine Zoölogy. The conditions which regulate the use of the income of this Scholarship are similar to those of the Tyndall Fellowship, and are given in Appendix B to this Report.

But little change has taken place in any of the Exhibition Rooms now open to the public. The model of the East Coast of the United States has been placed in the Geographical Room, but unfortunately we have been unable to make any progress

in its final arrangement, or in that of the Geological Exhibition Room. Extensive changes have been undertaken in the North American Faunal Room to accommodate the Greene Smith Collection of Birds.

We have continued to fill a few of the gaps existing in our collections by purchases, mainly from Ward. Our greatest desiderata are now in the African Room, where we should have, in order to make the collection more characteristic, a good Hippopotamus, a Giraffe, and a few additional Antelopes. We have devoted one of the wall cases of that room to the Fauna of Madagascar. All the Lemurs and other characteristic Madagascar Mammals, as well as the few Madagascar Birds formerly in our African Faunal Collection, have now been placed in the cases devoted to the Fauna of Madagascar. It is astonishing to see how the peculiar mammalian fauna of that island gains in distinctness, now that it is separated from its African surroundings. This and the Australian faunal exhibits show at a glance the value of such an arrangement in our Museum.

The rooms containing the Quaternary Pampas Vertebrate Fossils, and a few Tertiary Mammals, are now open to the public. No more interesting exhibit could be made than by supplementing what has already been placed on exhibition with a series of our North American Fossil Vertebrates.

The collections of the Museum continue in good condition. I regret that Dr. Hagen's prolonged ill-health has made it impossible for him to attend to his usual duties at the Museum. Owing to our insufficient means, we have been unable to continue Professor Hyatt's salary at the Museum. He has, however, kindly consented to keep a general supervision over the palæontological collections, which of course suffer less from want of attention than our more perishable zoölogical material. It has been found necessary to give more care to the latter, and Professor Walter Faxon has been placed in charge of the Invertebrate collections.

Professor Edmond Perrier has returned the Starfishes of the "Blake" which had been sent to him for examination, and has at the same time presented to the Museum, in behalf of the Jardin des Plantes, an extensive series of the Starfishes of the "Talisman" expedition, types of the species described by him.

Professor Alphonse Milne-Edwards has now returned the "Blake" Crustacea, with the exception of the Galatheoids, which

he has kept for comparison while working up the Crustacea of the "Talisman."

Professor Verrill still has in his possession the Alcyonoids of the "Blake" expedition, and reports fair progress in their determination; he also reports that Miss Bush's paper on the Northern Atlantic Mollusks collected by the "Blake" during the expedition of 1880 is nearly ready for publication.

Professor Milne-Edwards's Memoir on the Paguridæ of the "Blake" is now in press. The plates have been completed, and we hope to publish it early this winter.

Considerable progress has also been made in the press-work of the Special Bulletin No. 2 of the National Museum, which will contain the Deep-sea Fishes of the "Blake," by Professor Goode and Dr. Bean.

We have received during the year an anonymous contribution, to be applied to the increase of Dr. Hagen's salary. The Corporation have kindly consented to assume a part of Dr. Hagen's salary, and charge it upon the retiring allowance fund. This has enabled me to engage Mr. Samuel Henshaw to devote some time to the care of the collection, and to superintend its use by specialists.

Among the principal additions to our collections I may mention two skins of the Wingless Rail from the Sandwich Islands, presented by the Hon. S. B. Dole of Honolulu; also, by purchase, a small collection of the principal birds of the Hawaiian group, intended for the Pacific Exhibition Room.

From Ward we have obtained a magnificent alligator for the North American Room.

We have to thank Mr. Charles Wachsmuth for a number of interesting Fossil Crinoids.

The fine Rhytina skeleton presented to us by the Smithsonian Institution has been mounted by Ward and placed in the Pacific Room. We have also received from the National Museum a cast of the well known Trilobite, with its appendages, described by Mr. C. D. Walcott; and from Mr. N. P. Miller, a collection of Starfishes from Alaska. Professor Mitsukuri of the Imperial University of Tokio has presented a fine Metacrinus, and a Hyalonema from off Misaka, as well as specimens of Astacus and of the Ditrema so common in Japanese waters. From a comparison of this viviparous perch with our Californian Em-

biotocoid I find that it corresponds to the American genus *Micrometrus* of Gibbons.

Since the Hume Collection of Indian Birds was presented to the Museum we have not received from any quarter so valuable an addition to our stock as the Collection of North American Birds presented to the Museum by Mrs. Greene Smith, of Peterborough, N. Y. The terms upon which the collection has been given to the Museum are most liberal, and while the collection will remain intact as the Greene Smith Collection, it will at the same time form the bulk of our collection of North American Birds, just as the Hume Collection practically forms the Bird Collection of the Indian Room. The Greene Smith Collection is well known to ornithologists as perhaps the most complete and best mounted collection of North American Birds brought together by a private individual. The Museum is fortunate in being chosen by Mrs. Smith as the recipient of so valuable a collection, and we have to thank her most cordially for the liberal conditions which she attaches to the gift. (See Appendix C.)

We have to thank the Swiss Confederation for sending us, through the Polytechnicum, a large number of topographical maps published by that government.

We owe to Mr. Binney the plates which accompany the last Supplement to his *North American Land Shells*, published in the *Museum Bulletin*.

The Museum has sent to Dr. Dall for examination a small collection of Tertiary Fossils from the Isthmus of Panama, sent us by Mr. F. Sousa.

The remainder of our collection of Bats has been forwarded to the Marquis Doria, at Genoa, for examination.

We have also sent out for examination small collections of Reptiles, of Sharks, and of Fishes to Messrs. Goode and Bean.

A number of Crinoids have been sent to Mr. Wachsmuth for comparison.

A number of European geologists, who attended the International Congress of Geologists held at Washington last year, visited the Museum, and examined, as far as practicable, some of the special collections in which they were interested.

That part of the collections of the "Albatross" expedition of 1891 which is to be worked up at Cambridge has been received in excellent condition, with the exception of the Aca-

lephs, which I fear will hardly give me the material I hoped to have at my disposal when the collections were made. Mr. Westergren, the artist who accompanied me on the "Albatross," is now at work at the Museum, and has completed a number of the plates intended to illustrate the monograph of Mr. Faxon on the Crustacea of the expedition. He will next devote his time to the Fishes and the Echini.

With few exceptions, the remaining collections are now in the hands of the specialists who have kindly consented to work them up. Short preliminary reports are already under way to illustrate the more novel types. Among them is a notice by Professor Ludwig of some interesting Holothurians, with sketches of the species in their natural attitudes, from drawings made on board by Mr. Westergren and myself. Professor Ludwig also informs me that he has already finished the descriptive text of three families, and that a number of plates of Holothurians are well under way. Dr. Goës has finished a notice of the gigantic Foraminifer mentioned in my Preliminary Report, and described by him as a new genus (*Neusina*). Both these papers will shortly be published.

Preliminary reports have also been made to Colonel McDonald, the United States Fish Commissioner, by Mr. Ridgway, on the Birds of the Galapagos, and on the small collection of Insects by Dr. Riley.

Colonel McDonald has shown the greatest interest in the collections of the "Albatross," and has given me his cordial co-operation in their final distribution. He assigned to Mr. Richard Rathbun the care of the large collections on their arrival at Washington, and the cordial thanks of the naturalists who are to work up this valuable material are due to him for the thorough manner in which he has accomplished the laborious and thankless task of forwarding from Washington to their destinations the different collections, with the consent of the Fish Commissioner.

I have myself published in the Museum Bulletin a preliminary account of the "Albatross" expedition, and have described in the Memoirs the interesting Stalked Crinoid, *Calamoerinus*, discovered by the "Albatross" off the Galapagos.

We have also received from Captain Tanner of the "Albatross" an interesting collection from intermediate depths from the surface to three hundred fathoms, made with the Tanner tow-net in 1892, during the exploration for a telegraphic cable from California

to the Sandwich Islands. A preliminary examination of the material apparently confirms the views expressed in my preliminary report of the "Albatross" expedition regarding the bathymetrical distribution of pelagic life.

The Comatulæ of the "Blake," which were in the hands of the late Dr. P. H. Carpenter, have been sent to Dr. Hartlaub of Göttingen, who will work them up in connection with those of the "Albatross." I have to thank Mr. Percy Sladen for the trouble he has taken in making the transfer to Dr. Hartlaub.

I consider myself most fortunate in having the opportunity to take charge of the publications of so interesting an expedition as that of the "Albatross" in 1891. I am sure that I represent the views of scientific men in expressing a regret that so little has thus far been published in connection with the Fish Commission work regarding the marine fauna of the east coast of the United States, considering the splendid opportunities which have been supplied. It seems strange that Congress should not have made liberal appropriations for the working up by specialists of the magnificent collections brought together during so many years by the vessels of the Fish Commission.

A collection of Deep-sea Echini and Ophiurans, from the various deep-sea explorations sent out under the auspices of the Coast Survey, has been sent to the British Museum, in exchange for similar material given to the Museum by the "Challenger" expedition.

Appendix A of this Report contains a list of the publications of the Museum issued during the past academic year. We have published four numbers of the Bulletin, forming Volume XXII. of the series, and three numbers of the twenty-third volume. Of the quarto Memoirs two numbers have been published. The independent publications of the gentlemen connected with the Museum will be found enumerated with their reports. The Library continues to increase, and our exchange list is on a most satisfactory footing.

I give herewith plans and different views of the Newport Marine Laboratory, showing its present condition. The Laboratory was fully described in my Report of 1876-77. Its efficiency has been increased by the addition, on the second floor, of a photographic room and microphotographic apparatus. An additional room of considerable size has also been attached to

the building, to be used as a library and a private laboratory for myself. The unit adopted for the working space of each individual has been slightly increased in the new room, and as now planned it will be a simple proposition to erect a new Laboratory for general purposes and for special investigation by adopting the dimensions now in use for each table.

As it has gradually become apparent that each institution will eventually wish to control its own Marine Laboratory, and that no co-operation is possible between the different Universities, it has occurred to me that some expansion of the Newport Marine Laboratory might meet the demands of Harvard University. I would here say that various attempts have been made at such co-operation without success. At the time the Anderson School was abandoned, an appeal was made to the Colleges throughout the country to establish a central zoölogical station, but it received no encouragement. A second attempt was made, in connection with the late Professor Baird, to interest the Natural History departments of the larger Universities in supporting a laboratory for research at Wood's Holl in connection with that of the Fish Commission. This likewise failed. Since then the independent action of the Johns Hopkins University, of the University of Pennsylvania, of the University of California, of the Leland Stanford Jr. University, and of others, confirms the impression that every such institution is to have its own establishment for modern zoölogical research.

But if a central laboratory is no longer to be thought of, it may be practicable to form an international association of marine laboratories, the members of which will exchange the facilities each may possess, so that all may share in the advantages of position as regards special opportunities for investigation at the different stations. Or it might be that with the help of such joint action an association might be formed for the establishment of a marine laboratory within the tropics in the vicinity of a coral reef. While many such schemes loom up as possibilities, in view of the increased interest in this kind of research, the more immediate and important question is whether Harvard, like other Universities, shall have a marine laboratory to facilitate the research of her own students.

Towards this something might be done in the near neighborhood of my own laboratory at Newport, if the necessary means

can be raised. In some form or other, I have had this in mind since 1876, when the Marine Laboratory at Newport was opened, to which a certain number of the more advanced students of Harvard University were regularly invited. In doing this, I had always hoped that the time might come for joining with other institutions in establishing a more general laboratory for research. Such a plan has become impracticable, as we have seen ; but it still seems to me that if Harvard is to have a marine laboratory of her own, the conditions at Newport are very favorable.

I would therefore propose that whenever sufficient means can be obtained a large Laboratory for research should be built on the east side of the cove on which my own Laboratory is placed, and that a dwelling-house for the use of students be erected on a suitable lot in the immediate vicinity. A large sea-going launch, suitable for dredging within fifty to seventy-five miles from Newport, is also needed, to give better collecting facilities than we have had before, and to supply larger material for the work of the Laboratory.

Until this shall be accomplished, a certain number of advanced students will continue to make use, as hitherto, of the limited room and facilities afforded by the existing Laboratory. But it is evident that whatever can be offered will only be an adjunct as it were of the larger establishment which must soon be necessary if Harvard is to keep pace with sister Universities in this department of study.

For the less advanced students it would be necessary to equip the aquarium planned for the Museum, and it would be possible, with our facilities, to provide during the summer months for the instruction in marine zoölogy of a large number of students at a comparatively small expense, and thus to limit the use of the smaller Laboratory at Newport to the more advanced students.

The addition of a large public Aquarium to the equipment of the Newport Laboratory would be an important adjunct. A most interesting and instructive public exhibit could easily be made from the more common marine animals of this part of our coast, and it is quite possible to obtain the support of a sufficient number of the residents of Newport in the establishment of an Aquarium, as considerable interest has always been manifested in such a project. The Aquarium once built and in running

order, there is little doubt that its ordinary expenses could be met by annual subscriptions and by the small admission fees charged to the transient public.

It would of course be of immense advantage if the Laboratory could control a large steamer of about two hundred feet in length, to be used for research and as a peripatetic laboratory for exploration along all parts of our coast or elsewhere. Such facilities, however, demand a large original outlay and a large annual expenditure. From \$75,000 to \$100,000 would be needed for the equipment of the vessel, and an annual income of from \$25,000 to \$30,000 to run it to advantage, and to provide the means of publication for the Station. Such an equipment would, however, be unique among the stations now in existence, and nothing would tend to develop more rapidly our knowledge of the natural history of the sea than such a vessel, well equipped and in charge of a director competent to undertake even distant expeditions devoted to the solution of some special problem of thalassography.

ALEXANDER AGASSIZ.

CAMBRIDGE, October 1, 1892.

REPORTS ON THE GEOLOGICAL DEPARTMENT.

I. REPORT ON THE COURSES OF INSTRUCTION.

BY PROFESSORS J. D. WHITNEY, N. S. SHALER, W. M. DAVIS, AND ASSISTANT
PROFESSOR J. E. WOLFF.

DURING the Academic year 1891-92, the following named courses of instruction were given in the laboratories and in the field by the instructors in the department.

Instruction in Geology.

1. Geol. 4. A half-course in Elementary Geology; two lectures a week by N. S. Shaler, with one hour for special exercises conducted by R. E. Dodge, Assistant in Geology, with required reading in Dana's Manual of Geology. In the spring, voluntary excursions were made to points of geological interest in the vicinity of Cambridge under the guidance of the assistant. The course was attended by two hundred and forty-six students.

2. Geol. 5. A half-course of Practical Geological Exercises in the Laboratory and in the field, with occasional lectures by T. W. Harris, assisted by H. B. Kummel; designed especially for those who intend in subsequent years to continue the study of Geology and Palæontology. Half-course, with two-hour exercises, twice a week. Attended by eighty-seven students.

3. Geol. 8. A course of Advanced Geology, two lectures a week, and for a part of the year three, by N. S. Shaler, with an additional hour for review of assigned reading conducted by J. B. Woodworth. Students in this course were required during the second term to prepare theses on subjects chosen with the advice of their instructors. During the first and third terms, eight half-day excursions were made into the field in the vicinity of Cambridge, under the guidance of J. E. Wolff and J. B. Woodworth. Those only who passed a satisfactory examination in the elementary courses were permitted to attend. Fifty-six students received this instruction.

4. Geol. 9. A course in the Structural and Dynamical Geology of the stratified rocks, by T. W. Harris. Two lectures a week, with required reading and theses. This course was attended by seven students.

5. Geol. 18. A course in Economical Geology, by J. D. Whitney, assisted by L. G. Westgate. Lectures twice a week, with required reading and theses. Attended by twenty-eight students.

6. Geol. 22. A course in field-work and geological surveying, designed to afford special training, with work in the library and the preparation of geological reports, under the direction of N. S. Shaler, W. M. Davis, J. E. Wolff, and T. W. Harris. Conferences were held once a week during the year. This course is open only to those who have attained satisfactory grades in Courses 8, S. 2, and in either Chemistry C or 2. It was attended by seventeen students.

Instruction in Palæontology.

7. Geol. 14. A course in Palæontology, by N. S. Shaler, assisted in the Laboratory by R. T. Jackson. Two lectures a week, with four hours' laboratory work and theses. This course was attended by eleven students.

8. Geol. 15. A course in Historical Geology, designed to train advanced students in the use of fossils in determining geological horizons, by N. S. Shaler, assisted by R. T. Jackson. This course was taken by one student.

9. Geol. 24. A course in Palæontological Research, under the direction of N. S. Shaler, assisted by R. T. Jackson. Attended by one student.

Instruction in Meteorology and Physical Geography.

10. Geol. 1. A half-course in Elementary Meteorology, by W. M. Davis, assisted by R. DeC. Ward. Two lectures a week, with two hours of laboratory work and recitation, first half-year. Attended by eighty-four students.

11. Geol. 2. A half-course in Physical Geography, by W. M. Davis, assisted by R. DeC. Ward. Two lectures a week, with two hours of recitation and laboratory work, once a week, second half-year. Attended by one hundred and seven students.

12. Geol. 20. A course in Advanced Meteorology and Physical Geography, by W. M. Davis. Conferences held once a week. Attended by eight students.

Instruction in Petrography.

13. Geol. 12. A course in Petrography, by J. E. Wolff. Two lectures a week, with laboratory work, theses, and field work. Attended by thirteen students.

14. Geol. 23. A course in Petrographic Research, by J. E. Wolff. Field and laboratory work. Attended by four students.

Instruction in Summer Schools.

15. Geol. S. 1. An elementary course, beginning July 6th and lasting five weeks, was held in Cambridge, in the Geological Laboratory, by T. W. Harris and H. B. Kummel. This course is parallel to Geology 5, as given in the University. Meetings were held five days each week, with field-work in the vicinity of Cambridge. One excursion was made to the Cambrian and Carboniferous deposits in the town of Attleborough, Mass. This course was attended by sixteen students.

16. Geol. S. 2. An advanced course in field-work on the geology of the stratified rocks was given at the following places during the summer of 1892. The class met at Utica, N. Y., July 7, under the charge of T. W. Harris. On July 20, the class moved to Catskill, N. Y., and on the 4th of August went to Meriden, Conn., where the work of the class was in charge of H. B. Kummel. This course closed on August 19. Twelve students attended the course.

17. Geol. S. 3. A half-course in independent field investigation and geological surveying, under the supervision of N. S. Shaler, W. M. Davis, J. E. Wolff, and T. W. Harris. Two parties of students began work in this course in Eastern Massachusetts in the summer of 1892, one with Dr. Harris on the Structure of the Boston Basin, and a second with J. B. Woodworth on the Carboniferous and Cambrian Rocks of Norfolk and Bristol Counties. The work in this course lasts for six weeks, and will be completed before October 1st. Six students have taken this instruction.

Additional Instruction.

During the year, the students in the advanced courses attended regular Tuesday evening meetings in the Geological Laboratory, which were designed to serve the purpose accomplished by the Seminaria of the German Universities. A number of the papers read at these conferences have been announced in the College Calendar. In addition to the papers presented by students, a paper was read by Baron de Geer, of Sweden, "On the Changes of Level on the Atlantic Coast."

II. REPORT OF THE STURGIS-HOOPER PROFESSOR OF GEOLOGY.

BY JOSIAH D. WHITNEY.

DURING the past year a course of sixty lectures on Economical Geology was delivered to about twenty-five students, mostly Graduates and Seniors. As the instruction in this subject is now arranged, the subject of Economical Geology occupies two years, the first half of the course being, as a general rule, taken by Seniors or Juniors, and the second half by Graduate students. In the former, the subject of the mode of occurrence of the metalliferous ores is very briefly treated; in the latter, the metals, mining, and metallurgy form the chief topics to which the attention of the student is directed. Both courses together are intended to furnish a desirable amount of information in regard to the economical and practical side of Geology, either to the general student or to those intending to become teachers of the science, and are also preparatory for special studies in this department, to be taken later by those who find themselves able and inclined to go further in this direction.

The arrangement and cataloguing of the Sturgis-Hooper Library has been continued by Miss Clark. The remarks in regard to this matter which were made last year are still applicable.

The climatic investigations spoken of last year as being under way are still in hand, and the material which has been collected is now being arranged for publication.

III. REPORT ON COURSES IN GENERAL GEOLOGY.

BY N. S. SHALER.

THE course in Elementary Geology (Geol. 4) has been materially strengthened by adding to the usual lectures, about sixty in number, special meetings which are designed to afford further opportunities for acquiring a clear idea of the more difficult parts of the subject matter. These meetings have been held in small

sections of from fifteen to twenty students, under the charge of Mr. R. E. Dodge, Assistant in the Department. They are in effect recitations, and they have clearly served to secure ends which experience shows are unattainable by a lecture system alone, however fully that method may be supplemented by frequent examinations.

In the course of Advanced Geology (Geol. 8), Mr. J. B. Woodworth has done a task similar to that effected by Mr. Dodge in the elementary course; but in addition to holding special meetings in small sections for recitation and review, he has supervised the preparation of theses which the members of the class are required to write, and he has also aided Professor Wolff in the field instruction.

Early in the year, Dr. R. T. Jackson was employed to take charge of the laboratory work in the first course in Palæontology (Geol. 14), and of the considerable collection which has gradually been provided for the use of that class. By his aid, the detailed instruction which is intended to supplement the lectures and book-work has been at length brought to a satisfactory state. The collection has been increased by the purchase of specimens needed to extend the series of fossils which are of the most importance for the use of students, and which could not be spared from the general collections of the Museum. Dr. Jackson has also rendered assistance to the student in Historical Geology (Geol. 15) and Palæontological Research (Geol. 24).

The large magic lanterns placed in the Geological Lecture-room have been used throughout the year in the elementary courses (Geol. 4 and 5) with profit and success. Five cases, accommodating ninety-six trays, have been placed in Room 2, for the use of the Palæontological Assistant, and several volumes needed for laboratory work have been added to the library in the same room.

A number of specimens illustrating geological phenomena have been added to the teaching collection in the Geological Laboratory. Among the most important is a second block from Kelly's Island in Lake Erie, showing glacial fluting and striation, given by Benjamin Cook, Esq. A portion of a mastodon's jaw, with several teeth attached, from the Pleistocene deposits of Iowa, was presented by Mr. John A. Mott.

The collection of photographs and lantern views has been

much augmented during the year. The work of cataloguing and arranging the collection has been nearly completed by Mr. J. L. Gardner, Jr., who, as volunteer assistant, has rendered valuable aid to the department. This collection has proved to be of very great value in our instruction. The phenomena of mountain structure and the relation of structure to topographic form, of glaciers and their effects, and of volcanic action, can now be effectively presented to the classes by the aid of these illustrations. The classification of the photographs and lantern slides, already undertaken, will provide an arrangement, first, according to localities, and, secondly, by means of cross references to particular classes of subjects, which can thus be easily brought together for temporary use.

IV. REPORT ON THE LABORATORY OF PHYSICAL GEOGRAPHY.

BY W. M. DAVIS.

INSTRUCTION in elementary Physical Geography and Meteorology has been maintained during the past year, under the direction of Professor W. M. Davis, and with the assistance of Mr. R. DeC. Ward, on the plan described in the Report for 1890-91. The illustration of the lectures on Physical Geography by means of lantern slides has been the chief innovation, a large series of slides having been purchased or especially prepared for this course. Various forms of clouds were illustrated in the same way in the course on Meteorology. The elementary courses were repeated in parallel lectures during the year to classes in the Society for the Collegiate Instruction of Women. Three public lectures for teachers on Teaching Geography were given in the spring.

The advanced course in Physical Geography and Meteorology was attended by seven students, the following subjects being discussed in weekly conferences: thunder-storms in New England in 1886-87 (based on reports by volunteer observers of the New England Meteorological Society), the "eye" of the storm, the cyclonic storms of India, the diurnal variation of tempera-

ture at Denver, Col. (based on thermographic records lent by the Harvard College Observatory), the evolution of the Mississippi River, the physical geography of Wisconsin, the physical geography of Arkansas, and the rivers of Connecticut; the last three subjects being treated by students who were familiar with the States mentioned, either from residence, or from geological field-work within them.

Advanced work in Field Geology has been done by two graduate students, under the direction of Professor Davis, in connection with his study of the Triassic Area of Connecticut for the United States Geological Survey; besides which there has been special work in the Laboratory by Mr. L. S. Griswold in compiling a map of the Triassic Area from the reports of various assistants; and by Mr. S. Ward Loper in arranging and classifying an extended collection of Triassic fossils, which has since been sent to the National Museum in Washington.

The office of the New England Meteorological Society has been maintained in the Laboratory of Physical Geography for several years past. The monthly Bulletin of the Society, containing reports from about one hundred and fifty observers, has been issued regularly from this office, with the assistance of Mr. J. Warren Smith of the United States Weather Bureau, who was especially assigned to this work by the Chief of the Bureau, and with the support of the Director of the Harvard College Observatory, the Bulletin being published in the Annals of that institution. In March, 1892, it seemed advisable to transfer the work of collecting and publishing monthly meteorological reports to the New England Weather Service, established at that time for this purpose, the service being under the direction of Mr. Smith, and having its office in the rooms of the Weather Bureau, in Boston. Professor Davis has thus been relieved of the responsibility of superintending the preparation of the Society's Bulletins. At about the same time, the publication of the American Meteorological Journal was removed from Ann Arbor, Mich., to Boston; Professor M. W. Harrington, who had founded the Journal and edited it from the beginning, having removed to Washington on his appointment as Chief of the Weather Bureau, and his place as editor being assumed here by Mr. R. DeC. Ward, Assistant in Physical Geography. Mr. Ward has also undertaken a study of thunder-storms in New England

for the Weather Bureau, on a plan similar to that followed by Professor Davis for the New England Meteorological Society from 1885 to 1887. The results of Mr. Ward's work in this direction will be published by the Weather Bureau.

The collections of the Laboratory of Physical Geography have been increased chiefly in the direction of photographs and lantern slides. The most important additions are as follows:—

A series of cloud photographs, presented by Professor Denza, Director of the Specula Vaticana, Rome.

A series of cloud photographs in the Alps, presented by Jas. Eccles, Esq., of London.

A series of large landscape views on the line of the Baltimore and Ohio Railroad, presented by the company.

A series of views of Pilot Mountain, N. C., presented by the Cape Fear and Yadkin Valley Railroad Company.

A series of photographs and slides, purchased from the Alaskan expedition of 1891, led by Mr. I. C. Russell.

A series of Spitzbergen photographs, bought through Professor H. Sjögren, of Upsala, Sweden.

A series of photographs and slides of the Mascaret of the Seine at Caudebec, bought from A. Witz, Rouen, France.

An extended series of photographs and slides, purchased from Messrs. W. H. Jackson and Company, of Denver, Col., representing views in the Western Territories, Louisiana, Florida, and Mexico.

A large number of photographs and slides from Mr. S. R. Stoddard, of Glen's Falls, N. Y., representing landscapes in New York and New England.

A series of lantern slides made from photographs in the Laboratory collection, by Mr. P. P. Sharples, Class of '95.

Especial attention has been given during the past year to the extension of the University collections of modern topographic maps, on which the more advanced study of Physical Geography so largely depends. An appropriation for this purpose was granted to this department by the University Library Council, and topographic maps of Saxony, Austria, and the Netherlands have thus been purchased. It is hoped that this appropriation may be continued for some years, until the collection of modern maps is substantially completed. A large series of maps has been received from the United States Coast and Geodetic Survey, and from the United States Geological Survey.

V. REPORT ON THE PETROGRAPHICAL LABORATORY.

BY J. ELIOT WOLFF.

TWO courses were given in Petrography, an elementary course in General Petrography, and an advanced course in Petrographical Research. The first course was attended by fourteen students, and the second by five, — in all, the largest number since the establishment of the Laboratory.

The equipment was materially enlarged by the purchase of a large Voigt and Hochgesang petrographical microscope and two medium-sized microscopes, and in other ways. The collections were increased by the purchase of 150 rock specimens from Krantz in Bonn, and otherwise, and by the addition of 350 thin sections of rocks. The laboratory is also enabled to use, by the kindness of Mr. Agassiz, the large microphotographic and projecting apparatus of Zeiss, recently purchased.

It is a pleasure to record the gift to the University for the use of the Geological Department, by Dr. Lucius G. Hubbard, of the large and valuable collection of rocks from the Laacher See region in Germany, which formed the basis of his monograph in Tschermak's *Mineralogische und Petrographische Mittheilungen*, 1887, "Beiträge zur Kenntniss der Noseanführenden Auswürflinge des Laacher Sees."

Petrographical investigation was begun on the felsites of the Boston region by several students in common, which it is hoped will continue this year.

A monograph was completed by Mr. G. L. Collie on Conanicut Island, R. I., and investigations were carried on by Mr. J. B. Woodworth on rocks of the Narragansett Basin, and by Mr. L. G. Westgate on rocks from Jenny Jump Mountain, N. J. A paper, by the instructor jointly with R. S. Tarr, "On Akmite Trachytes from the Crazy Mountains," is ready for publication.

The instructor was engaged during the year with several assistants in the study of the structure of the Archæan Highlands of New Jersey, and the study of the eruptive rocks of the Crazy Mountains was continued.

PUBLICATIONS BY MEMBERS OF THE GEOLOGICAL DEPARTMENT.

THE following papers of a scientific nature have been published during the year.

By N. S. Shaler:—

1. General Account of the Fresh Water Morasses of the United States, with a Description of the Dismal Swamp of Virginia and North Carolina. Tenth Annual Report of the Director of the United States Geological Survey, Washington, D. C., 1890, pp. 255-339, Plates VI.-XIX. 38 figs.

2. The Antiquity of the Last Glacial Period. *Proc. Bost. Soc. Nat. Hist.*, March 4, 1891, Vol. XXV. pp. 258-267.

3. The Story of Our Continent: a Reader in the Geography and Geology of North America, for the Use of Schools. Boston, U. S. A., published by Ginn and Company, 1892, pp. 290. (Illustrated.)

4. Report on the Work done in the Atlantic Coast Division of the United States Geological Survey for the Year ending June 30, 1889. Tenth Annual Report of the Director of the U. S. Geological Survey. Washington, D. C., pp. 117-119, 1890.

By W. M. Davis:—

Ferrel's Contributions to Meteorology. *Amer. Meteorological Journ.*, 1891, VIII. 348-359.

The Catskill Delta in the post-glacial Hudson Estuary. *Proc. Bost. Soc. Nat. Hist.*, 18 Nov., 1891, Vol. XXV. pp. 318-334. Illustrated.

The Lost Volcanoes of Connecticut. *Pop. Sci. Mo.*, Dec., 1891, XL. 221-235. Illustrated.

The Theories of Artificial and Natural Rain. *Amer. Meteorol. Journ.*, March, 1892, VIII. 493-502.

Mirage on a Wall. *Ibid.*, pp. 525, 526.

Meteorology in the Schools. *Ibid.*, 1892, IX. 1-21.

The Teaching of Geography. I. The Physical Basis of Descriptive Geography. *Educational Rev.*, May, 1892, Vol. III. pp. 417-426.—II. What to avoid in Teaching Geography. *Ibid.*, June, 1892, Vol. IV. pp. 6-15.

Note on Winter Thunderstorms. *Amer. Meteorol. Journ.*, Aug., 1892, IX. 164-170.

Biographical Notices of Professor William Ferrel. *Science*, Nov. 13, 1891; *Nation*, Oct. 29, 1891; and *Pop. Sci. Mo.*

Outline of Elementary Meteorology. A Synopsis of Course "Geology 1" at Harvard College, 1892-93. Cambridge, Wheeler, 1892, 12mo, pp. 13.

Outline of a Course in Elementary Descriptive and Physical Geography, for Grades IV. and V. in the Cambridge Grammar Schools, 1892-93, 8vo, pp. 45.

Four Elementary Essays on the Shore Lines of Lake Bonneville, the Cañon of the Colorado, the Folds of the Appalachians, the Mountains of Pennsylvania, in Goldthwaite's Geographical Magazine, January, March, April, and May, 1892.

By J. E. Wolff: —

The Geology of the Crazy Mountains, Montana. Bull. Geol. Soc. America, 1892, Vol. III. pp. 445-452.

By T. W. Harris: —

Mount Bob, Mount Ida, or Snake Hill. American Journal of Science, March, 1892, Vol. XLIII. pp. 236-238.

By R. DeC. Ward: —

Another River Pirate. Science, 1892, XIX. 7-9.

Artificial Rain; a Review of the Subject to the Close of 1889. Amer. Meteorol. Journal, 1892, VIII. 484-493.

Thunderstorms in New England during the Year 1886. Ibid., 1892, IX. 21-28.

Thunderstorms in New England during the Year 1887. Ibid., 1892, IX. 211-215.

The first Scientific Balloon Voyage. Ibid., 1892, IX. 58-63.

By J. B. Woodworth: —

Note on the Occurrence of erratic Cambrian Fossils in the Neocene Gravels of the Island of Martha's Vineyard. American Geologist, April, 1892, Vol. IX. pp. 243-247. (3 figs.)

The following theses by students in the advanced course in Physical Geography have been published during the year past: —

The Drainage of the Bernese Jura, by Aug. F. Foerste, Graduate Student. Proc. Bost. Soc. Nat. Hist., 1892, XXV. 392-418. With two Plates, and a Supplementary Note on the Drainage of the Pennsylvania Appalachians, by W. M. Davis. Ibid., 418-420. (Note. The thesis by Mr. Foerste was prepared in the academic year 1889-90, but its publication was delayed until after its author had studied his subject on the ground in Switzerland in the following year.)

The Eye of the Storm, by S. M. Ballou, Class of '93, Harvard College. Amer. Meteorol. Journal, 1892, IX. 67-84, 121-127.

Objections to Faye's Theory of Storms, by W. C. Moore, Special Student, Lawrence Scientific School. Ibid., 170-177, 197-206.

REPORT ON THE INSTRUCTION IN ZOÖLOGY.

BY E. L. MARK.

THE courses of instruction in Zoölogy have been the same in their general scope during the past year as in the year 1890-91, but the courses formerly conducted by Dr. G. H. Parker have been carried on by Dr. C. B. Davenport.

As will be seen from the accompanying table, there were one hundred and ten students in Zoölogy 1. The First Assistant in the course was Mr. H. M. Kelly, the Second Assistant Mr. J. C. Hubbard.

Dr. Davenport had the assistance of Mr. W. S. Nickerson in the laboratory work of Zoölogy 2, in which there were forty-five students.

Zoölogy 3 was conducted by Dr. Davenport alone, there being nineteen students in the course.

There were seven students, principally Graduates and Seniors, in each of the Courses 4 and 5. Dr. Woodworth, who has been appointed Instructor in Microscopical Anatomy, in addition to assisting in the laboratory work of both these courses, delivered a part of the lectures in Zoölogy 4.

Dr. Slade proposes in the future to make his course in Osteology (Zoölogy 10) a research course for advanced students, and it will hereafter be designated as Zoölogy 20*c*.

Of the nine students pursuing special work (Zoölogy 20*a*), two received at the last Commencement the degree of Doctor of Philosophy.

The number of students from the separate classes in each of the zoölogical courses is given in the following table:—

Class.	Gr.	Sen.	Jun.	Sop.	Fr.	Spec.	Sci.	Total.
Zoöl. 1	4	13	13	23	23	14	20	110
" 2	4	11	10	9	2	4	5	45
" 3	4	5	6	1		2	1	19
" 4	3	3				1		7
" 5	3	3				1		7
" 10	1	1	2				1	5
" 20 _a	6	1					2	9

The meetings of the Zoölogical Club have been well attended, and of the usual interest.

Besides supervising the Contributions from the Zoölogical Laboratory, I have finished the translation of O. Hertwig's *Lehrbuch der Entwicklungsgeschichte des Menschen*, etc., which will be issued simultaneously by Swan Sonnenschein & Co. in London, and Macmillan & Co. in New York. I have also made a short contribution to the "Festschrift für Leuckart," to be published in October, entitled *Polychærus caudatus*, *nov. gen. et nov. sp.*

Since my last report the following Contributions from the Zoölogical Laboratory have been published in the Museum Bulletin:—

XXVIII. Observations on Budding in Paludicella and some other Bryozoa. By C. B. Davenport. (12 Plates.) December, 1891, Bull. Mus. Comp. Zoöl., Vol. XXII. No. 1, pp. 1-114.

XXIX. The Gastrulation of Aurelia flavidula, Pér. & Les. By Frank Smith. (2 Plates.) December, 1891, Bull. Mus. Comp. Zoöl., Vol. XXII. No. 2, pp. 115-126.

XXX. Amitosis in the Embryonal Envelopes of the Scorpion. By H. P. Johnson. (3 Plates.) January, 1892, Bull. Mus. Comp. Zoöl., Vol. XXII. No. 3, pp. 127-162.

XXXI. The Mesoderm in Teleosts; especially its Share in the Formation of the Pectoral Fin. By E. R. Boyer. (8 Plates.) April, 1892. Bull. Mus. Comp. Zoöl., Vol. XXIII. No. 2, pp. 91-134.

XXXII. On Nectonema Agile, Verrill. By Henry B. Ward. (8 Plates.) June, 1892. Bull. Mus. Comp. Zoöl., Vol. XXIII. No. 3, pp. 135-188.

The following papers are under way:—

By C. B. Davenport : —

On *Urnatella gracilis*, Leidy. 6 Plates.

Notes on the Carotids and the Ductus Botalli of the Alligator.
1 Plate.

By W. E. Ritter : —

On the Eyes, the Integumentary Sense-papillæ, and the Integument of
the San Diego Blind-fish (*Typhlogobius Californiensis*, Steindachner).
4 Plates.

REPORT ON OSTEOLOGY.

BY D. D. SLADE.

THIS department has received no important additions since the last annual report.

The collections remain in excellent condition, and have received neither damage nor loss.

Several specimens have been received for identification, and two small collections from different sources, which were offered during the vacation, have not yet been determined.

Instruction by means of lectures, examinations, and laboratory work has been given during the academical year to five students, three of whom were undergraduates, one was a Graduate, and one a Lawrence Scientific Student. The work performed by them has been generally satisfactory.

The Assistant hopes to make the course of instruction during the coming year one in which research will receive more attention than heretofore.

The following papers have been published by me during the past year:—

Osteological Notes. The Jugal Arch in the Order Insectivora. *Science*, Vol. XIX. p. 203.

Osteological Notes. The Jugal Arch in the Order Rodentia. *Science*, Vol. XX. p. 46.

Some of the orders in the collection of disarticulated skeletons are still sadly deficient in specimens, — a want which can only be supplied through the generosity of some patron who understands the importance of this department to the scientific student.

REPORT ON THE MAMMALS AND BIRDS.

 BY WILLIAM BREWSTER.

The collection of mounted Mammals has received the following additions : —

A *Solenodon* (*Solenodon cubanus*) from Cuba ; two Armadillos (*Dasypus sexcinctus* and *Tatusia novemcincta*) from Brazil ; an arboreal, prehensile-tailed Porcupine (*Syntheres prehensilis*) from Costa Rica ; a Hare (*Lepus nigricollis*) from India ; a small Deer (*Dorcatherium aquaticum*) from West Africa ; a Tree Hyrax (*Dendrohyrax arboreus*) and a small Rodent (*Georynchus capensis*) from Cape Colony ; and a Genet (*Genetta vulgaris*) from Algeria (?). The last named is the gift of Dr. H. J. Bigelow. All the others were bought of Ward.

The collection of Mounted Birds in the North American Room has long been an object of adverse comment on the part of visitors critical in such matters, and a source of mortification to the Assistant in this department. Made up chiefly of birds prepared by a taxidermist, whose handiwork, although neat and smoothly finished, is aggressively stiff and conventional, and containing a number of moth-eaten, faded, and dust-stained specimens, contributed years ago by the Harvard Natural History Society, this collection, while perhaps not inferior in quality to the average exhibits of American museums, has suffered by comparison with the superior material in the other and more recently equipped faunal rooms.

It has been Mr. Agassiz's intention to remedy this defect, as soon as opportunity offered and the funds of the Museum permitted, by discarding all but a few of the very best or rarest of the Birds in the North American Room, and replacing them by really well mounted specimens. Such an opportunity has at length occurred, and without the anticipated expense ; for Mrs. Greene Smith, of Peterborough, N. Y., has just given to the Museum,

under certain very reasonable conditions, about twelve hundred North American birds, together with nearly three hundred Humming-birds from North, Central, and South America. These specimens constitute the greater part of a collection widely known among ornithologists as the "Greene Smith Collection," and of which a catalogue has been printed and distributed.

In many respects the collection of mounted North American birds is the most complete and valuable that has ever been brought together, at least by private effort. It was begun in 1867, and the work continued up to the time of Mr. Smith's death, in 1880, after which only a few specimens were added. At first, Mr. Smith hoped to collect all the birds himself, and very many were taken by him personally, chiefly in Madison County, New York, Cook County, Illinois, and Hernando County, Florida; but failing health finally compelled him to abandon this plan, and to buy a considerable number of skins, most of which, together with all the Humming-birds, were obtained from John G. Bell, of New York City. The entire collection, with the exception of a few birds, was mounted by Mr. Bell, who at one time stood foremost amongst American taxidermists, and whose best work is perhaps not excelled by any of the present day.

The conditions above referred to are, in brief, that the North American birds shall be kept together and known as the "Greene Smith Collection," and that each specimen originally belonging to it shall be so labelled. Imperfect or otherwise unsatisfactory specimens may be discarded, but all such must be returned to Mrs. Smith or her heirs. The collection may be added to, however, at the discretion of the officers of the Museum.

These conditions have been accepted, and the collection has been safely transported to Cambridge. It will be arranged and placed on exhibition as soon as some changes necessary for its reception have been made in the cases of the North American Room. Some of the best of the old birds will be retained and added to the new collection, but most of them will be unmounted and distributed among the collection of skins. The Humming-birds are to be placed in a case by themselves, probably in one of the Systematic Rooms.

An important addition has been made to the exhibit in the Pacific Room by the purchase, from Mr. Scott B. Wilson, of the following birds from the Sandwich Islands: *Charadrius fulvus*,

Bernicla sandvicensis, *Psittacirostra psittacea*, *Acrylocercus nobilis*, *Acrylocercus braccatus*, *Chrysomitridops cæruleirostris*, *Vestiaria coccinea*, *Loxioides bailleni*, *Hemignathus olivaceus*, *Hemignathus procerus*, *Phæornis obscura*, *Himatione virens*, *Himatione sanguinea*, *Oreomyza bairdi*, *Chasiempis ridgwayi*, *Chasiempis dolei*. Two Rails, probably *Corethrura obscura* (Gmel.), sent to Mr. Agassiz by Mr. William T. Brigham, at the request of Hon. S. B. Dole, by whom they were obtained from Laysón Island, will also be mounted for this collection, which now represents most of the species resident in and peculiar to the Sandwich Islands.

The only further acquisitions in this department are two specimens, male and female, of the "Oropendula" (*Gymnostinops montezuma*), with several of its curious nests, from Copan, Honduras, presented by the Peabody Museum Honduras Expedition, and a Brazilian Parrot (of the genus *Chrysotis*), received from Mrs. Josiah W. Cook, of West Somerville, Mass.

REPORT ON THE REPTILES AND FISHES.

BY SAMUEL GARMAN.

THE following are included in the list of those who have contributed to the collections in these departments by donation: Mr. Bradlee Whidden, Mr. N. Vickary, Dr. J. G. Owens (through Prof. F. W. Putnam), Dr. T. G. Lee, Dr. L. C. Jones, Dr. W. M. Haines, Mrs. Capt. Josiah W. Cooke, Miss I. Batchelder, and Prof. Alex. Agassiz.

Parcels were taken out for the United States National Museum, Prof. F. H. Snow, Prof. C. J. Maynard, Dr. G. A. Boulenger, Dr. T. G. Lee, Prof. J. W. P. Jenks, and the University students.

Valuable exchanges have been received from Dr. Georg Baur, Prof. J. W. P. Jenks, Dr. Julius Hurter, the United States National Museum, and the Imperial Museum at St. Petersburg. From the last we received important types from Central Asia. Dr. Hurter, from the Southwestern States, sent us living specimens, which before killing provided occasions for new and confirmatory observations on disputed points, and which afterwards were put into excellent condition for the exhibition cases. The lot from Professor Jenks contained representatives from the Gulf coast of the Southwest. Dr. Baur's collections were from the Galapagos Archipelago and the adjacent South American coast. These last, with that of Professor Jenks, were determined and subjected to special study and publication. In connection with the routine work, the exhibit for Madagascar has been selected and put in place, and various changes and additions have been made in other representations. To the number of large mounted specimens have been added a large Alligator, various Sharks, several Fishes, and some Land Tortoises. The Deep-sea Fishes taken in the work of the United States Fishery Commission steamer "Albatross" in the tropical Pacific are now in hand, under investigation.

Besides reviews and book notices on kindred subjects, not signed, the subjoined publications have been sent out during the year.

In the Memoirs of the Museum of Comparative Zoölogy, Vol. XIV. No. 2: —

“The Discoboli (Cyclopteridæ, Liparopsidæ, and Liparididæ).”

In the Bulletin of the Essex Institute: —

“The Reptiles of the Galapagos Islands.”

“On Texan Reptiles.”

“On Reptiles collected by Dr. Geo. Baur near Guayaquil, Ecuador.”

“On Cophias and Bachia.”

In the Proceedings of the Boston Natural History Society: —

“Dr. D. H. Storer’s Work on the Fishes.”

In the Annual Report of the Commissioners on Inland Fisheries of Massachusetts: —

“Report on the Lobster.”

In “Science”: —

“The Vesicles of Savi.”

“The Distribution of Fishes.”

“Dr. Storer’s Work on the Fishes.” (Also in Proc. B. N. H. Soc.)

“Sistrurus and Crotalophorus.”

“The Reptilian Rattle.”

REPORT ON THE PALÆONTOLOGICAL DEPARTMENT.

BY ALPHEUS HYATT.

THE Trigoniidæ, Ostreidæ, Pinnidæ, and some other families of Lamellibranchs, have been worked over with greater or less care, and materials selected for exhibition.

A large amount of miscellaneous work, which cannot be reported upon specifically, has been done in order to prepare the way for the selection of materials to be placed upon exhibition. The Schary, Day, Dyer, Walcott, and other collections of Silurian and Devonian Brachiopoda have been similarly treated, the genera brought together, and the materials picked out for exhibition.

The enormous number of specimens in these collections, and the fact that the same species frequently appears under different names, and the same genus in one collection may be split up into half a dozen genera in another, makes such work more tedious and difficult than had been anticipated. Before the specimens selected for exhibition are finally labelled, it will be necessary to revise the generic names to avoid confusion.

As in previous years, the department has had the benefit of the labors of Dr. R. T. Jackson. He has distributed the Triassic and Permian collections reported upon last year as still intact, and therefore all the Fossil Invertebrata are, with the exception of one tier of cases reserved for slabs and miscellaneous materials in Room A, arranged zoologically as described in the last Annual Report. He has also done considerable work in various departments which cannot be reported upon in detail, and has distributed into their proper genera a large number of Tertiary Lamellibranchs.

Miss Clarke has been employed as usual in dusting, securing specimens on tablets where necessary, writing labels, etc.

We have received from Messrs. Wachsmuth and Springer twenty-eight choice specimens of Crinoids from Indian Creek, Montgomery County, Indiana.

Mr. C. D. Walcott has returned a small collection of Lower Cambrian fossils, borrowed by him some years since for investigation.

The following papers have been published during the year by the Assistants in this department: —

Carboniferous Cephalopods, by Alpheus Hyatt, Geol. Surv. of Texas, Sec. Ann. Rept., 1890, pp. 329–356, with thirty-seven cuts.

Remarks on the Pinnidæ, by Alpheus Hyatt. Proc. Bost. Soc. Nat. History, XXV., 1891, pp. 335–346.

Beecher's Studies of the Brachiopoda (a Review), by R. T. Jackson. Am. Nat., Oct., 1892.

REPORT ON THE LIBRARY.

 BY MISS F. M. SLACK.

DURING the year ending September 1, 1892, the Library has received 584 volumes, of which 20 are Atlases, 1,915 parts, and 253 pamphlets:—

	VOLUMES.	PARTS.	PAMPHLETS.
Gift	6	57	12
Exchange	203	746	61
Purchase	54	238	1
A. Agassiz	145	856	25
Binding Parts	129		
Whitney Library	47	18	154
	<u>584</u>	<u>1915</u>	<u>253</u>

The number of volumes now in the Library (exclusive of pamphlets and the greater part of the Whitney Library) is 20,391. There are 14,296 pamphlets bound in 2,366 volumes, making the total number of volumes 22,757.

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PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

FOR THE ACADEMIC YEAR 1891-92.

Of the Bulletin.

Vol. XXII. [Complete.]

- No. 1. Contributions from the Zoölogical Laboratory. — XXVIII. Observations on BUDDING in PALUDICELLA and some other Bryozoa. By C. B. DAVENPORT. pp. 114. 12 Plates. November, 1891.
- No. 2. Contributions from the Zoölogical Laboratory. — XXIX. The GASTRULATION of AURELIA FLAVIDULA, Pér. & Les. By F. SMITH. pp. 12. 2 Plates. December, 1891.
- No. 3. Contributions from the Zoölogical Laboratory. — XXX. AMITOSIS in the EMBRYONAL ENVELOPES of the SCORPION. By H. P. JOHNSON. pp. 36. 3 Plates. January, 1892.
- No. 4. A Fourth Supplement to the Fifth Volume of the TERRESTRIAL AIR-BREATHING MOLLUSKS of the United States and Adjacent Territories. By W. G. BINNEY. pp. 42. 4 Plates. January, 1892.

Vol. XXIII.

- No. 1. Reports on the DREDGING OPERATIONS off the WEST COAST of Central America to the GALAPAGOS, to the West Coast of MEXICO, and in the GULF OF CALIFORNIA, in charge of ALEXANDER AGASSIZ, carried on by the U. S. Fish Commission Steamer "ALBATROSS." — II. GENERAL SKETCH of the EXPEDITION of the "ALBATROSS" from February to May, 1891. By A. AGASSIZ. pp. 90. 22 Plates. February, 1892.
- No. 2. Contributions from the Zoölogical Laboratory. — XXXI. The MESODERM in TELEOSTS: especially its Share in the Formation of the PECTORAL FIN. By E. R. BOYER. pp. 44. 8 Plates. April, 1892.
- No. 3. Contributions from the Zoölogical Laboratory. — XXXII. On NECTONEMA AGILE, Verrill. By H. B. WARD. pp. 54. 8 Plates. June, 1892.

Vol. XXIII. to be continued.

Of the Memoirs.

Vol. XIV.

- No. 2. The DISCOBOLI. Cyclopteridæ, Liparopsidæ, and Liparididæ. By S. GARMAN. pp. 96. 13 Plates. April, 1892.

Vol. XIV. to be continued.

Vol. XVII.

No. 2. Reports on an EXPLORATION off the WEST COASTS of MEXICO, CENTRAL and SOUTH AMERICA, and off the GALAPAGOS ISLANDS, in charge of ALEXANDER AGASSIZ, by the U. S. Fish Commission Steamer "ALBATROSS," during 1891. — I. CALAMOCRINUS DIOMEDÆ, a new STALKED CRINOID, with Notes on the Apical System and the Homologies of Echinoderms. By A. Agassiz. pp. 96. 32 Plates. January, 1892.

Vol. XVII. to be continued.

[B]

THE Virginia Barret Gibbs Scholarship Fund is to be established in connection with the Museum of Comparative Zoölogy at Harvard College, on the following conditions: —

To apply the net income thereof in supporting or assisting to support one or more students who may have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy.

Each person so assisted shall be either a graduate or a student in some department of Harvard University, but not necessarily a candidate for a degree. His studies and researches may be conducted at the Natural History Laboratories of the Museum of Comparative Zoölogy at Harvard College, at the Newport Marine Laboratory, or at such European Laboratories or other place on the sea-shore in this country or elsewhere as may be approved by the Faculty of the Museum of Comparative Zoölogy and by the Professors of Zoölogy and of Comparative Anatomy of Harvard University.

Such assistance may be continued to the same student from year to year, so long as he may be recommended by the Faculty of the Museum and the Professors aforesaid; but the appointment must be renewed annually, and only upon satisfactory evidence that the incumbent is fulfilling the purpose of the endowment.

If in the course of any year no students of sufficient ability and promise shall require aid from said fund, or for any reason the whole income of said fund shall not be expended, the surplus is to be added to the principal of the fund.

The President and Fellows are authorized at their discretion to impose such conditions and make such requirements upon the recipient of aid from said fund as will best secure his faithful devotion to the purposes of this foundation.

[C]

PETERBOROUGH, N. Y., August 18, 1892.

WILLIAM BREWSTER, Esq. : —

Dear Sir, — I wish to place the collection of birds, left by my husband, where it will be safe, well cared for, kept intact, as far as practicable, and made use of by students of ornithology ; and where it may remain a monument to the life-work of Greene Smith.

I will give the collection (with a few exceptions to be named hereafter) to the Museum of Comparative Zoölogy at Cambridge, Mass., on the following conditions : —

1st. That the North American Collection shall practically replace the present North American Collection of the Museum, and shall be kept together as far as possible ; each specimen to be labelled conspicuously with the name of Greene Smith.

2d. The Museum shall be allowed to make future additions to the collection ; but it shall be privileged to discard *only* such specimens as are positively bad.

3d. Any part of the collection which the Museum may at any time discard shall be returned to me or my heirs.

4th. The Museum, at its own expense, is to pack and transfer the collection within the next sixty days.

From the Collection of North American Birds I reserve one specimen, No. 886. I also reserve the foreign specimens, excepting the case of Humming-birds.

Yours very truly,

ELIZABETH F. SMITH.

[D]

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE, SEPT. 1, 1890.

Sturgis-Hooper Fund	\$100,000.00
Gray Fund	50,000.00
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Permanent Fund	117,469.34
Humboldt Fund	7,740.66
Virginia Barret Gibbs Scholarship Fund	5,000 00
	<hr/>
	\$585,737.11

The payments on account of the Museum are made by the Bursar of Harvard College, on vouchers approved by the Curator. The accounts are annually examined by the Museum Faculty and a committee of the Overseers. The only funds the income of which is restricted, the Gray and the Humboldt Funds, are annually charged in an analysis of the accounts with vouchers to the payment of which the income is applicable.

The income of the Gray Fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Humboldt Fund (about \$400) can be applied for the benefit of one or more students of Natural History, either at the Museum, the Newport Marine Laboratory, the United States Fish Commission Station at Wood's Holl, or elsewhere.

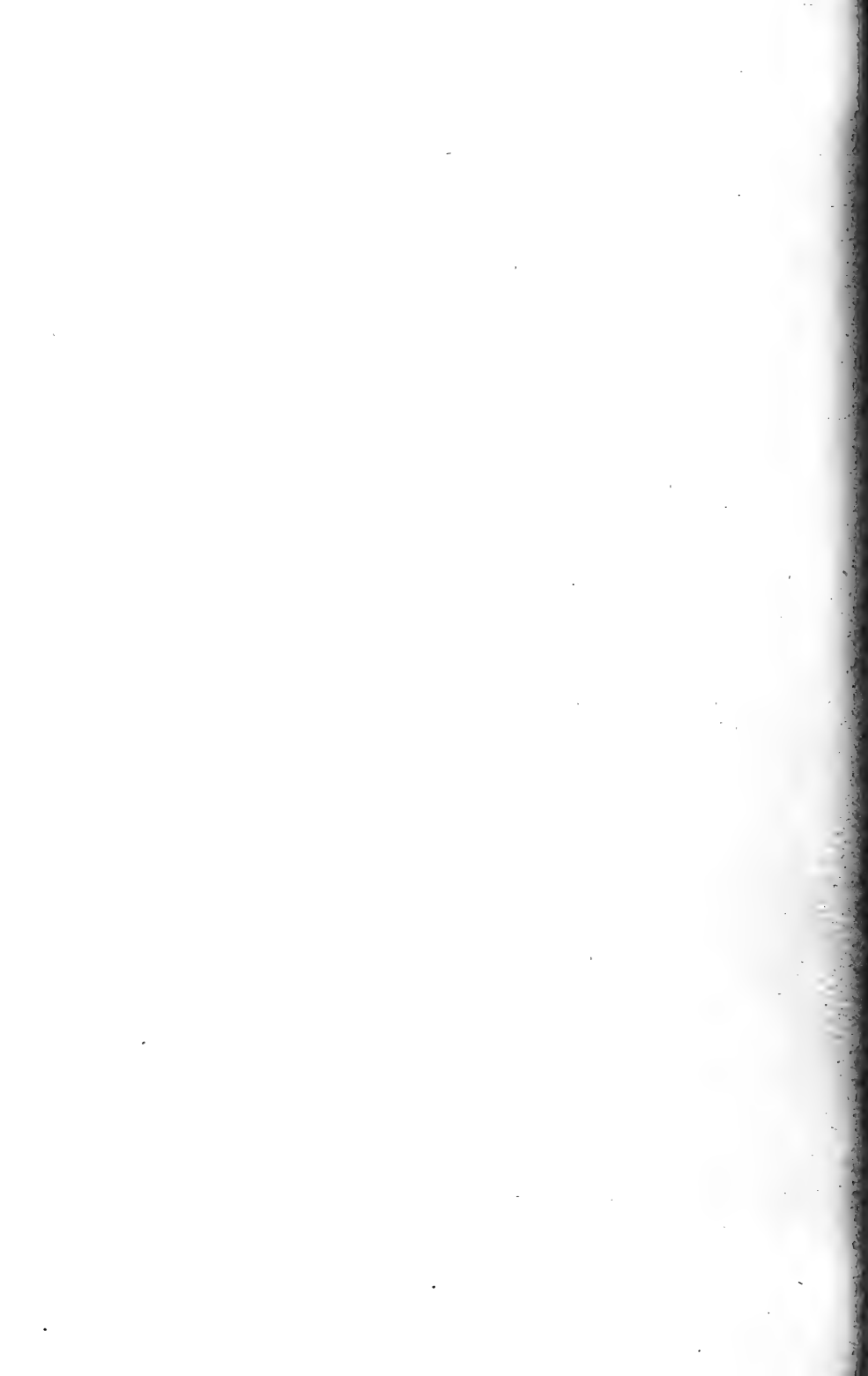
Applications for the tables reserved for advanced students at the Newport Marine Laboratory, and for the tables at the Wood's Holl Station, should be made to the Director of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.

The income of the Virginia Barret Gibbs Scholarship Fund, of the value of \$250, is assigned annually, with the approval of the Faculty of the Museum, at the recommendations of the Professors of Zoölogy and of Comparative Anatomy in Harvard University, "in supporting or assisting to support one or more students who have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy."



ANOTYPE, F. BRISTADT, N. Y.

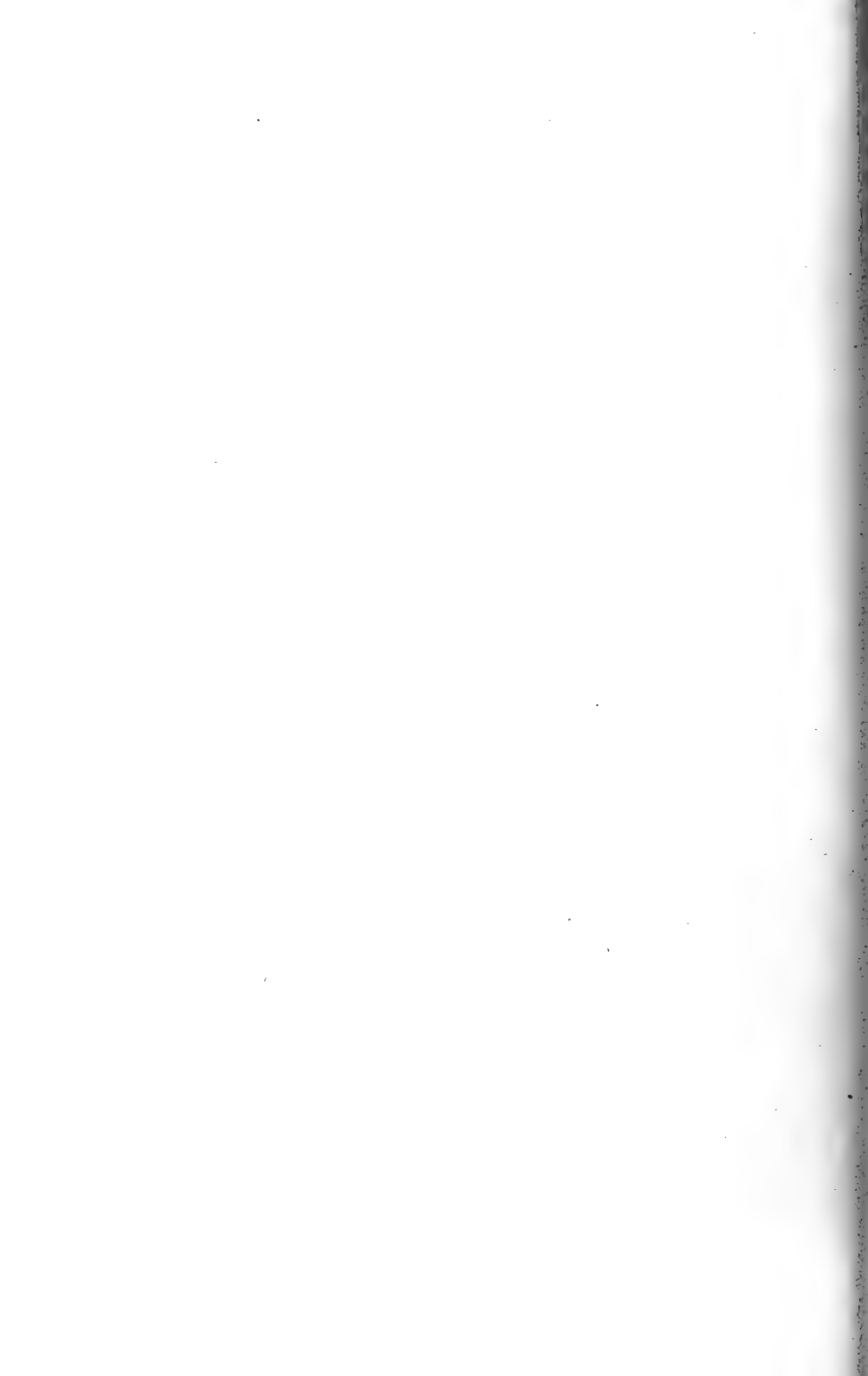
NEWPORT MARINE LABORATORY.
NORTH ELEVATION.

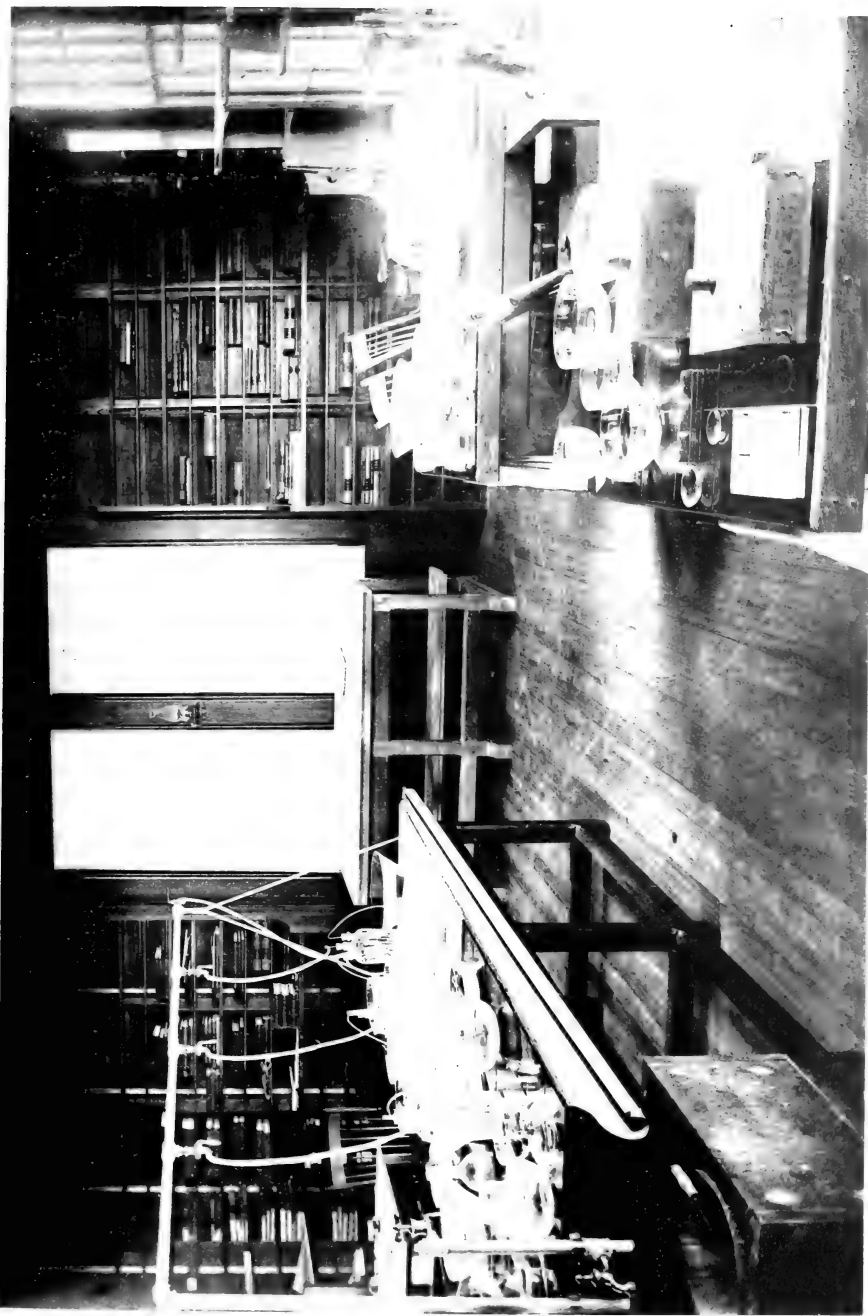




ARTIST BY J. BURSTADT, N. Y.

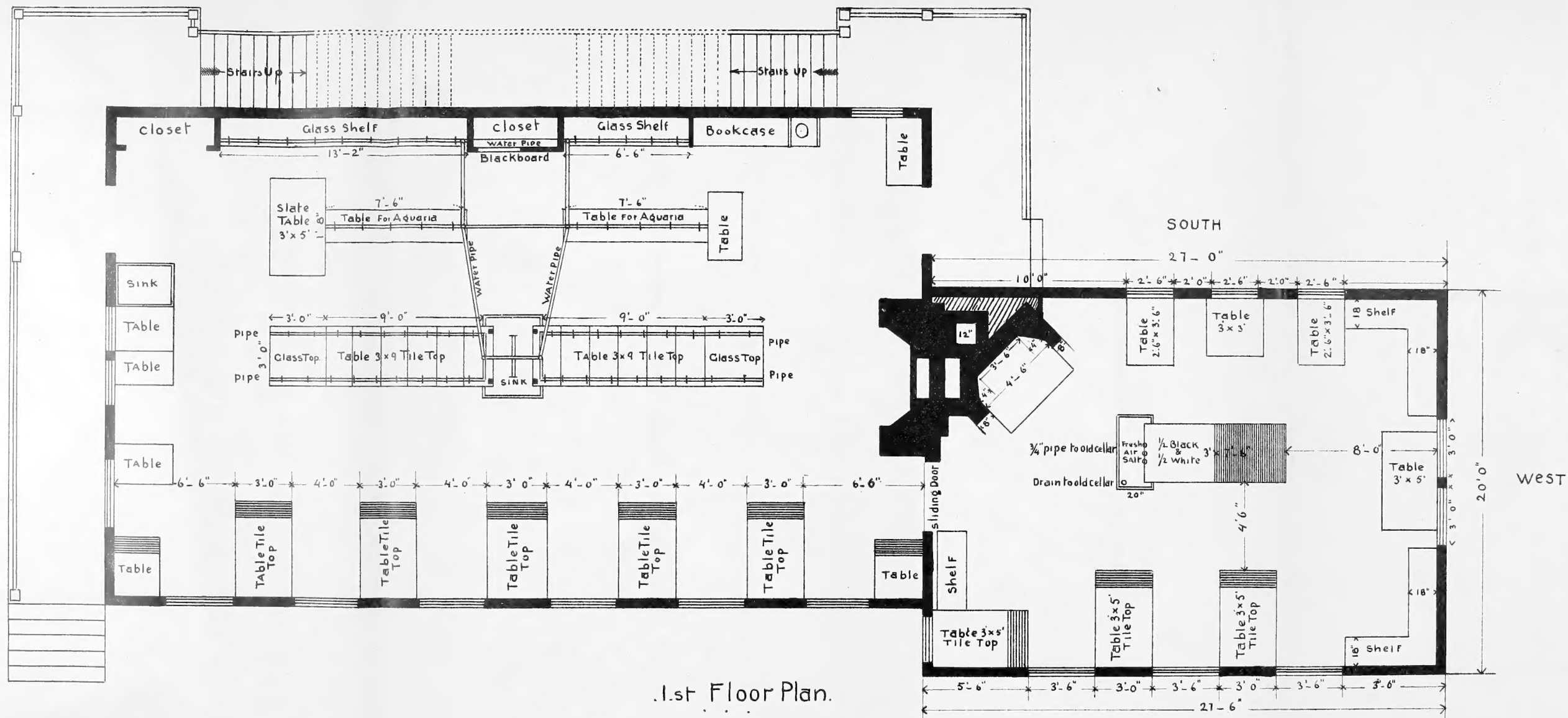
NEWPORT MARINE LABORATORY.
EAST ROOM



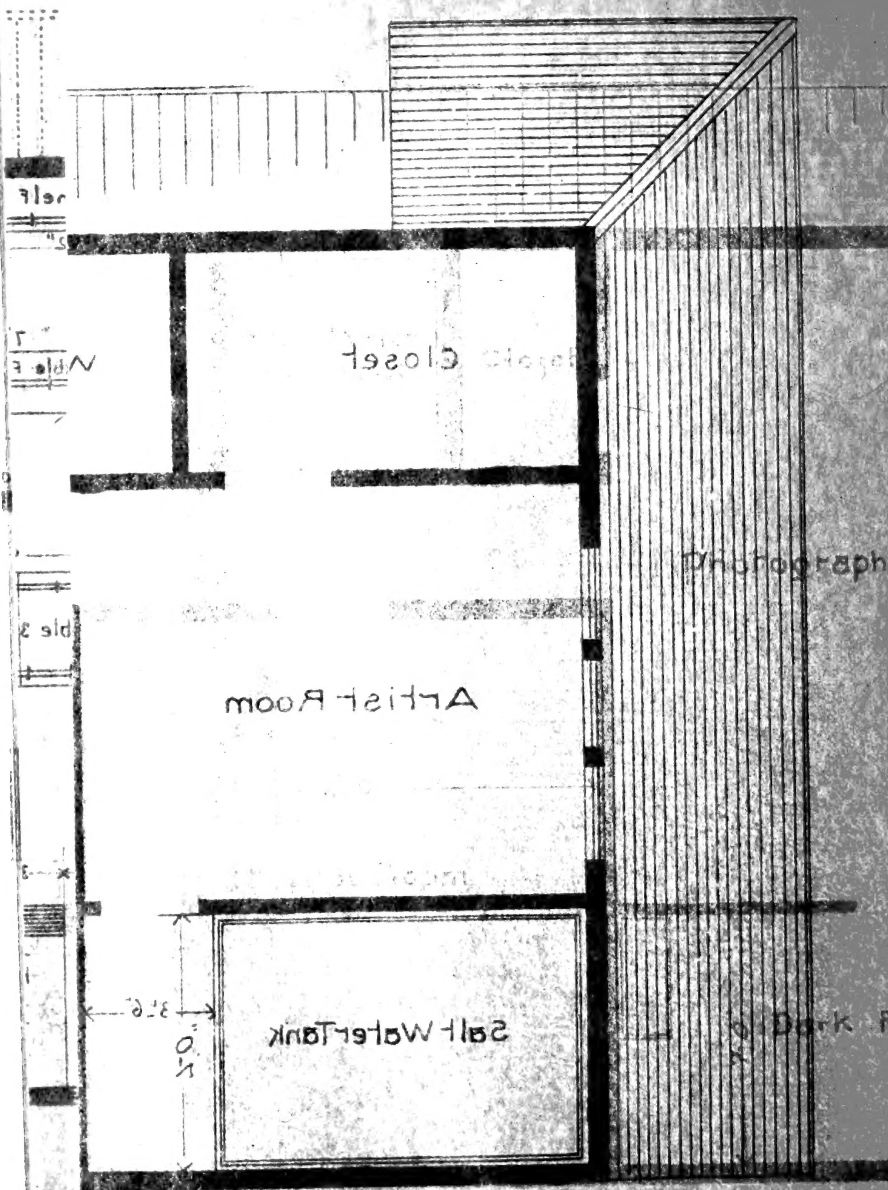


ALLOTYPE, E. GILBERT, N. Y.

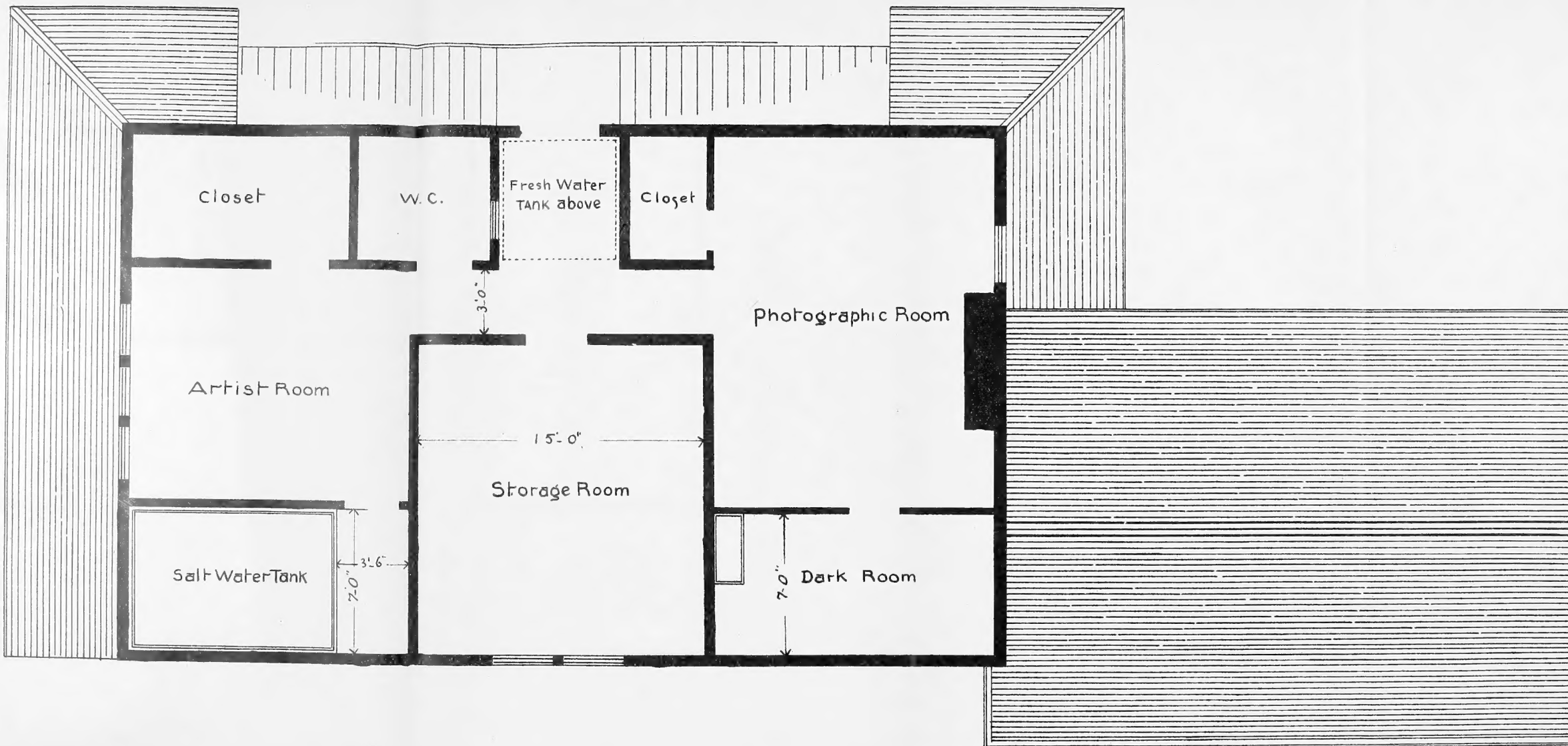
NEWPORT MARINE LABORATORY.
WEST ROOM.



1st Floor Plan.
 Zoological Laboratory
 Newport . . . Rhode Island.



Second Floor



Second Floor Plan .

